CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Recycled concrete aggregate is an engineering term that has been used to denote both fine and coarse aggregate reused in various engineering application (Hansen, 2000). These aggregates are obtained from a multitude of sources pertaining to industrial waste, construction and demolition waste. The properties of these recycled aggregates vary based on many factors such as characteristic strength of old concrete, the size of gravel used, the percentage of sand and gravel fraction in the concrete mix and amount of lime in the sand fraction of the old mix. They can be substituted with different percentages of replacement for fine and coarse aggregates in new mixes (Kotrayothar, 2012).

In general, it is considered as inert materials that generated from construction and demolition waste (CDW). In addition, the CDW can be obtained from broken concrete in demolition sites. Therefore, its use is increasing proportionately with the development of the towns and the countries. Thus, finding an appropriate procedure so as to get rid of this waste is a must. Reducing, reusing and recycling is appeared to be the best option for this purpose (Skevik, 2013). As a rule of thumb, the use of recycled aggregates in concrete is a promising and can pose many possibilities in the reuse of materials in the building industry (Vytlačilová, 2010). Hence, the implementation of recycled aggregates in structure and construction is a good solution to the problem of an excess of waste material. This obviously reduces the consumption

of the natural resources as well as the consumption of the landfills required for waste concrete. Recycling is the act of processing the used material for use in creating new product. As technology has significantly developed so far, the usage of natural aggregate is getting more and more intense with the advanced development in infrastructure are (Zuhud, 2008).

In Malaysia, the waste generated from construction and demolition activities is the major component that contributes to solid waste. Moreover, the increasing growth of the construction industry potentially generates substantial construction waste in Malaysia. Thus, this kind of waste can pose serious effects to the environment and cause social problems in local communities (Mohammad, 2013). Recently, there is a huge amount of waste generated in construction sites and estimated to be around 27,068.40 tons. In term of characterization perspective, the RAC promotes poor mechanical properties which are flexural strength and compressive strength. Previous studies have highlighted the benefits of large-scale recycling of concrete waste. These benefits are Controlling the over-discharge of construction and demolition wastes that otherwise would have been disposed in landfills and Decreasing the dependence of the construction industry on natural aggregates, thereby preserving natural resources, provides savings from the treatment of waste disposal, and yields alternative sources for urban areas facing shortage of natural aggregates (Chuan, 2010).

Therefore, it can be modified with natural fibers so as to enhance its properties. In this research, kenaf fiber is taken into consideration for this purpose.

Fiber as an additive to the RAC increases its structural integrity and strength (Omar, 2011). In general, some fiber is lower in the strength of recycled aggregate and some fiber provides greater impact, abrasion and shatter resistance. However, this can refer to the type of fiber reinforced with the RAC. In fact, there are many types of fiber can be used such as steel, glass, synthetic and natural fibers. Natural fibers have the potential to improve the usage of material related to environmental friendly. Natural fibers are considered as one the easier to be utilized for this purpose. It is cheaper compare to other fiber and low in energy level using the technology and local manpower (Ismail, 2015). However, the utilization of natural fibers is less popular in construction fields. Many types of natural fibers can be used such as sisal, coconut

coir, bamboo, jute, and sugarcane bagasse. The natural fibers used in this investigation are kenaf fibers as known as Hibiscus cannabjnus.

Nowadays, kenaf has been famous fiber used in the recycled aggregate concrete. kenaf is suitable to be grown in a tropical country like Malaysia and Indonesia due to its weather condition (Tezara, 2016). Recently, there are many new usages of kenaf including building material, absorbents, animal feeds and paper product. Kenaf is very good in mechanical properties and can grow very quick, rising with height of 4-5 in in within 4-5 month growing season and the diameter is around 25-35mm (Udoeyo, 2012). In this research, kenaf fiber is used to enhance the recycled aggregate properties such as flexural and compressive strengths and also to increase the toughness of the desired product that will be implemented in structure field.

1.2 PROBLEM STATEMENT

At the present, the use of recycled aggregates from construction and demolition wastes is showing prospective application in construction as alternative to primary (natural) aggregates. It conserves natural resources and reduces the space required for the landfill disposal. By recycling of construction and demolition wastes the environmental impact can be minimized to the lowest level and natural resource of aggregates will be saved (Zuhud, 2008). Recently, the natural resource protection is one of the important parts of environmental issues. Therefore, recycling will help to conserve natural resources for next generations. And this is the major challenges that our society communities face in today.

The recycling of concrete waste into recycled aggregate concrete (RAC) has been investigated as a potential source of construction concrete. RAC can be obtained through the demolition of the concrete elements of buildings and other construction. In addition, some countries, which are subjected to a political, global conflicts and war case, most of their structural buildings and infrastructures are destroyed and thus generating millions tons of aggregate waste. This is the current case in some of Middle East countries such as Syria, Yemen, Iraq and etc. however, in the most developed countries, the local authorities destroy the old building in order to construct new modernized buildings leading to originating a huge